

# Instrumentation for the KamLAND 4pi Calibration Pole

*Work-in-Progress - August 4, 2004*

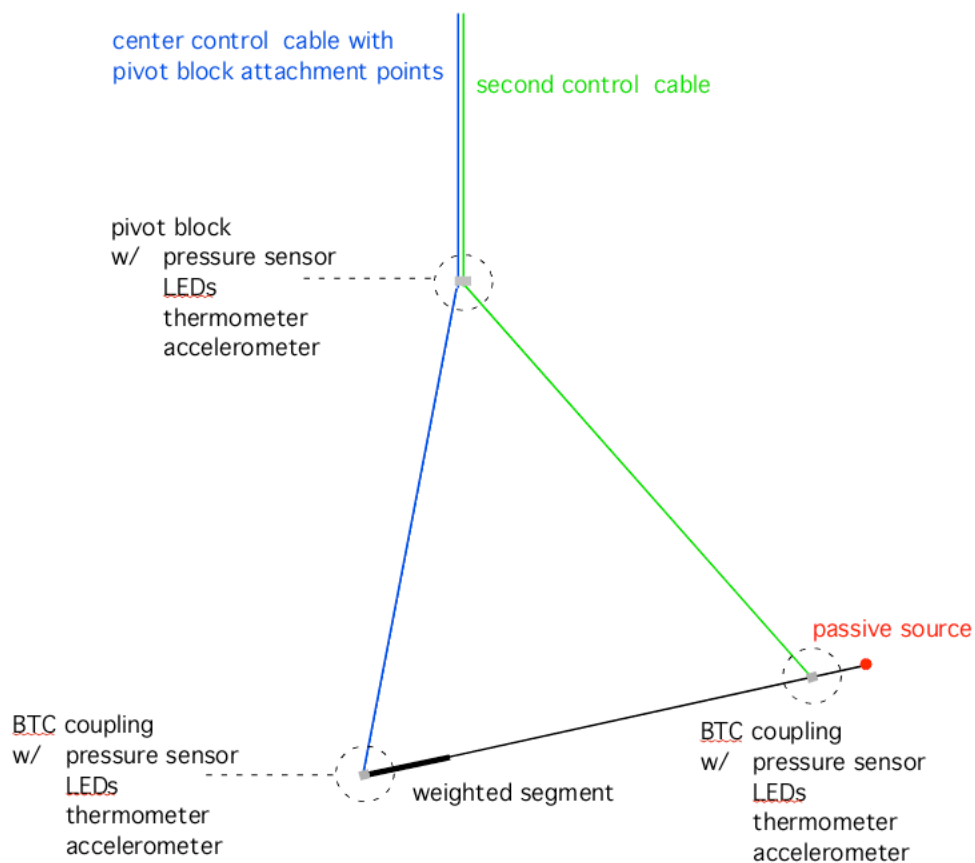
The 4pi Group

## Summary

The KamLAND 4pi calibration system will be equipped with 3 instrumentation units: two attached near the ends of the calibration pole and one attached to the pivot block. The instrumentation units at the ends of the calibration pole will be inside the titanium pole segments.

The instrumentation unit performs 4 functions:

1. Measures the temperature of the liquid scintillator to 0.5 degrees
2. Measures the pressure of the liquid scintillator
3. Controls the infrared LEDs
4. Controls both a single- and dual-axis accelerometer and inclinometer

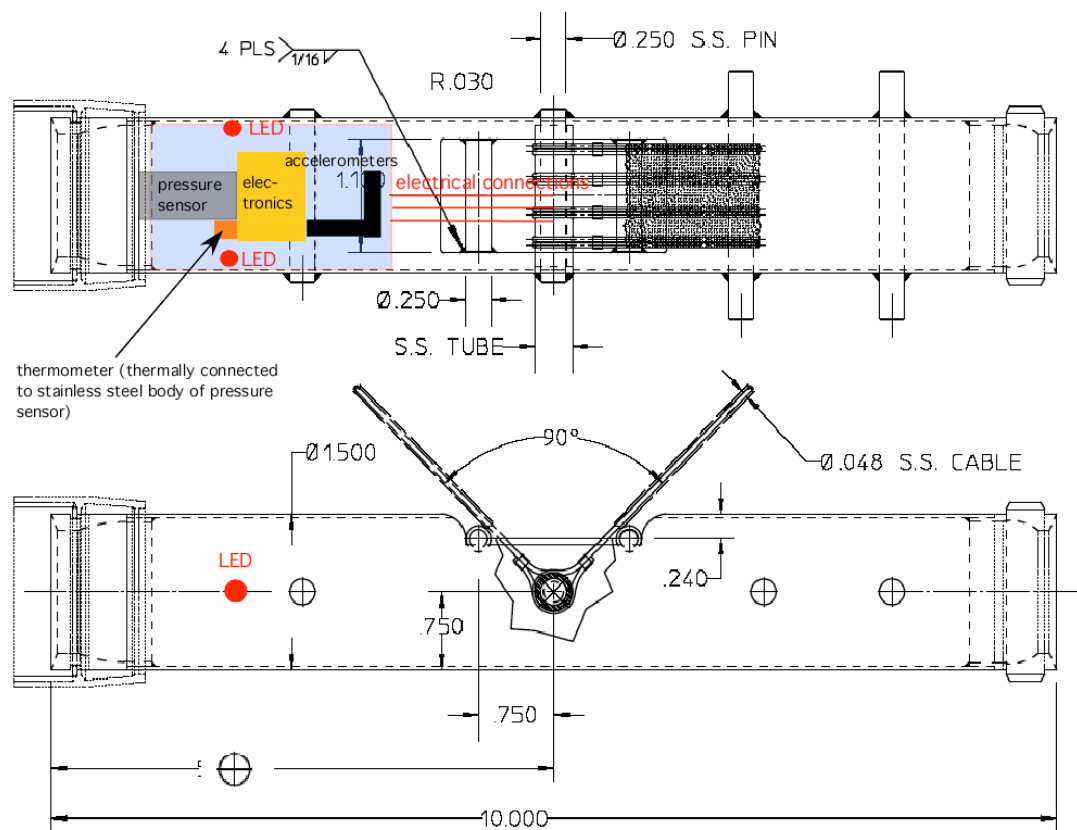


The entire instrumentation unit will be enclosed and sealed in approved materials. Gold-plated pins will provide the connections to the control cable.

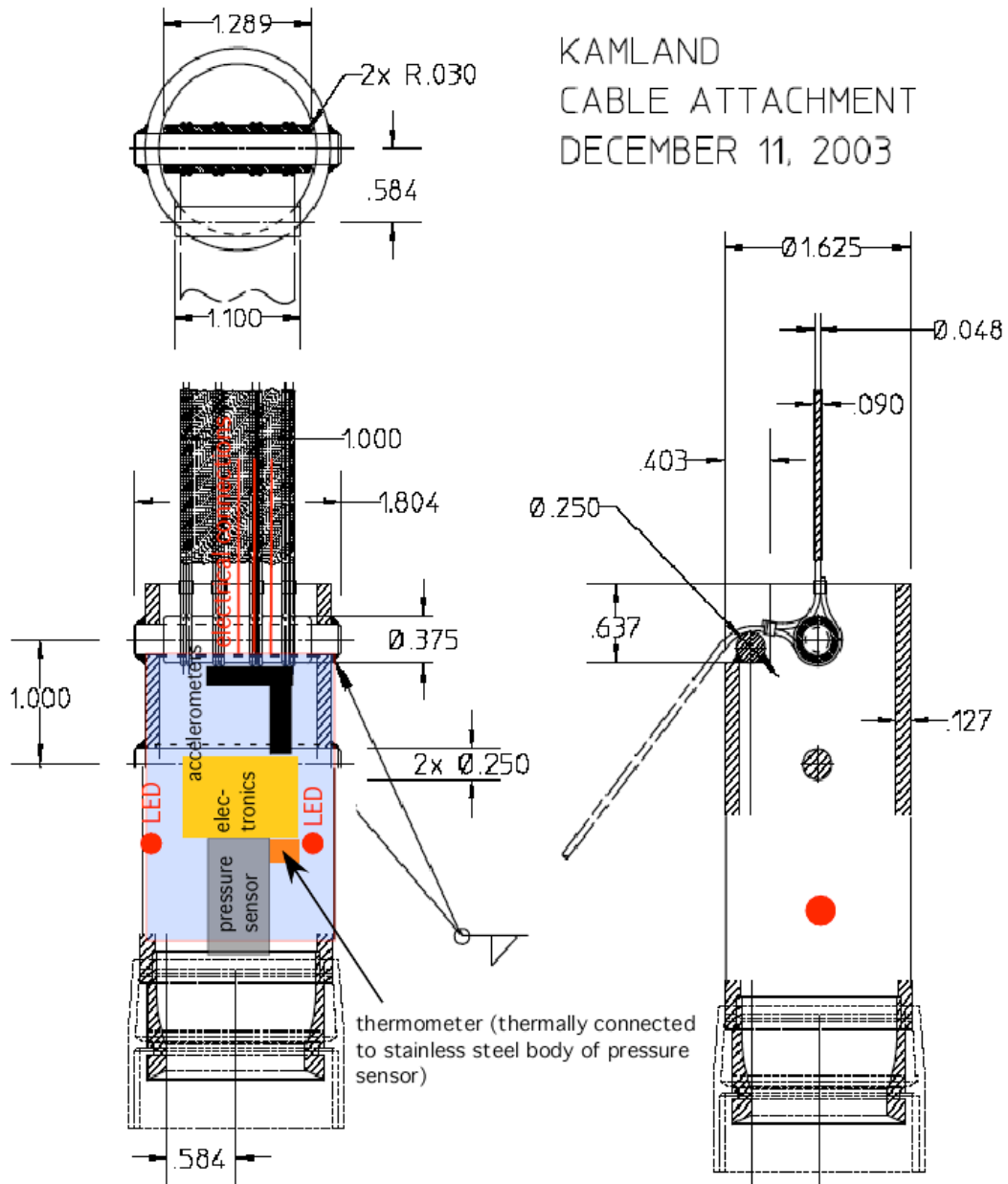
A list of the essential components of the instrumentation unit is given below.

Schematic layouts, data sheets, and pictures of the prototype instrumentation unit are attached in the Appendix. The enclosure still needs to be built.

### Instrumentation Unit in Source End of Calibration Pole



# Instrumentation Unit at Weight End of Calibration Pole

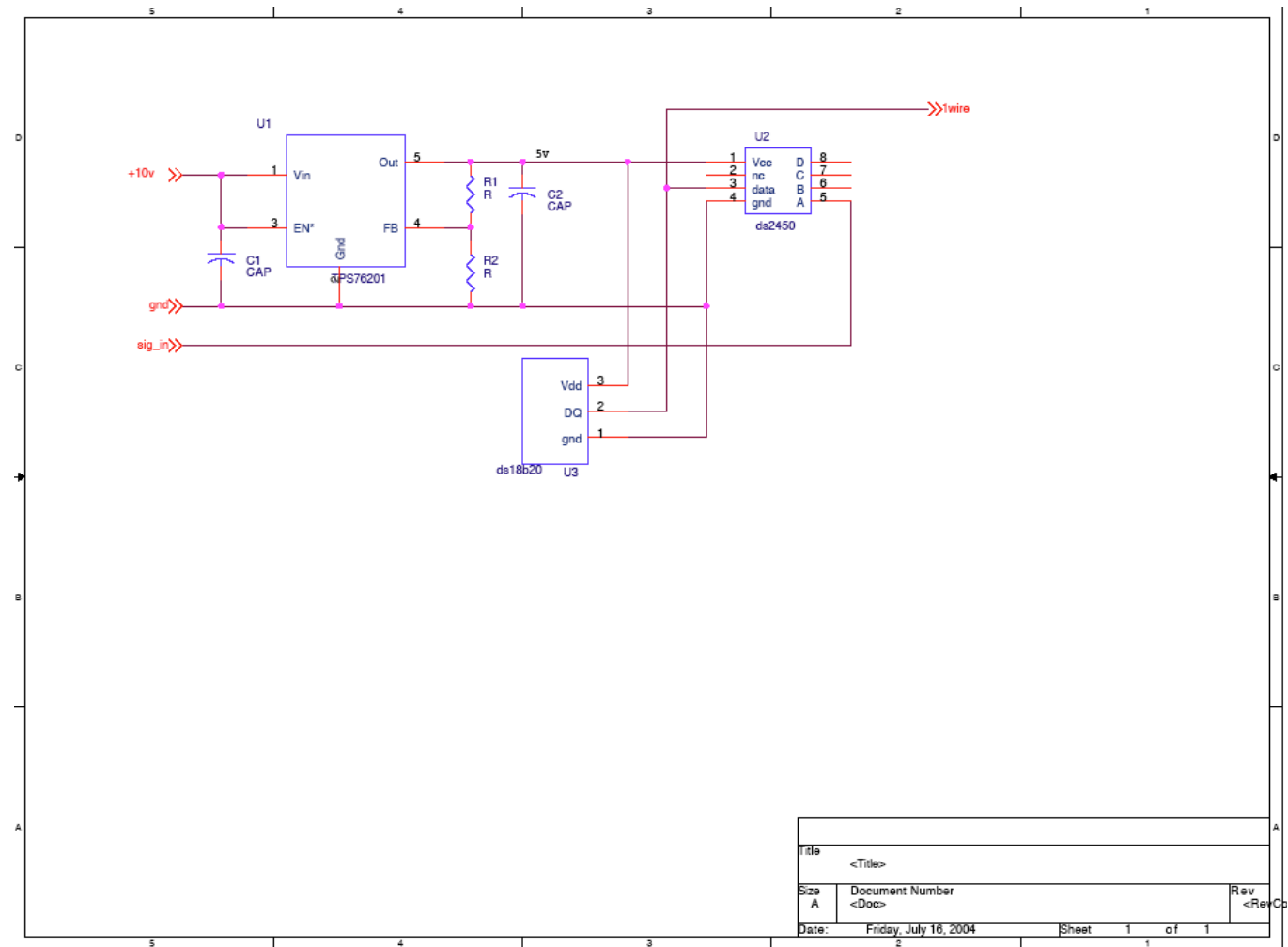


## Components

Component	Manufacturer/Product	Reference/Link
LED	Hamamatsu LED 3989-02	<a href="http://sales.hamamatsu.com/en/products/solid-state-division/optical-communication-devices/lan.php?goto=13195546&amp;&amp;group=1">http://sales.hamamatsu.com/en/products/solid-state-division/optical-communication-devices/lan.php?goto=13195546&amp;&amp;group=1</a>
Thermometer	Maxim DS18B20 High-Precision 1-Wire Digital Thermometer	<a href="http://www.maxim-ic.com/quick_view2.cfm?qv_pk=2812&amp;ln=">http://www.maxim-ic.com/quick_view2.cfm?qv_pk=2812&amp;ln=</a>
Pressure sensor	ICS Sensors 0085-030G-4C DigiKey MSP6854-ND	<a href="http://rocky.digikey.com/scripts/ProductInfo.dll?Site=US&amp;V=223&amp;M=85-030G-4C">http://rocky.digikey.com/scripts/ProductInfo.dll?Site=US&amp;V=223&amp;M=85-030G-4C</a>
Single-axis accelerometer	Analog Devices ADXL103	<a href="http://www.analog.com/Analog_Root/productPage/productHome/0,2121,ADXL103,00.html">http://www.analog.com/Analog_Root/productPage/productHome/0,2121,ADXL103,00.html</a>
Dual-axis accelerometer	Analog Devices ADXL203	<a href="http://www.analog.com/Analog_Root/productPage/productHome/0,2121,ADXL203,00.html">http://www.analog.com/Analog_Root/productPage/productHome/0,2121,ADXL203,00.html</a>
ADC	Maxim DS2450 1-Wire Quad A/D Converter	<a href="http://www.maxim-ic.com/quick_view2.cfm/qv_pk/2921">http://www.maxim-ic.com/quick_view2.cfm/qv_pk/2921</a>
Interface	ibuttonlink.com	<a href="http://www.ibuttonlink.com/Link_Details.htm">http://www.ibuttonlink.com/Link_Details.htm</a>

## Appendix

Figure 1: Schematic of 1-wire thermometer readout.



[illegible]